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San Francisco Bay Region
A Review
of Local Regulations
Related to
Geologic and Hydrologic
Hazards, Constraints
& Resources

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PURPOSE

This report summarizes the results of a review of local regulations related to geologic and hydrologic concerns. The project was undertaken to determine the current actions being taken by local governments in response to these concerns, including earthquakes, flooding, hillsides, bearing materials, and soil and mineral resources. These actions should indicate whether cities and counties have been effectively implementing their seismic safety programs. Also, these actions could be used to determine the appropriate type of cost one should calculate if a quantified land capability analysis were performed for the entire region.

MAJOR CONCLUSIONS

Local governments have far more comprehensive regulations than one might expect. Areas where requirements are not adequate include:

- mechanisms for mitigating hazardous buildings
- processes for building after an earthquake in a manner that minimizes public hazards from future earthquakes
- policies for areas that would be inundated should a dam or dike fail
- specific programs to ensure disclosure of areas of known geologic hazards or hazardous buildings

Hillsides or slope instability are considered by local governments to be the largest geologic problems. Earthquake-related issues are the second largest concern.

STUDY PROCEDURE

The early computer results of an initial ABAG survey of local government policies were used to determine the general types of regulations used. Next, conversations with ABAG staff who participated in the Local Policy Survey interview process provided examples of specific types of regulations. Third, selected seismic safety elements were reviewed to determine the types of policies that local governments implemented. The information gathered was used to develop a survey questionnaire to obtain specific information on local regulations.

Findings from the Local Policy Survey include:

- 75% of the jurisdictions that responded have adopted policies on environmental hazards, 13% have informal policies, 3% have indirect policies, and 8% have no policy.
- 20% of the jurisdictions have regulations to protect watersheds.
- 43% of the jurisdictions have slope/density zoning.
- 71% of the jurisdictions surveyed have adopted policies dealing with resource preservation, 12% have informal policies, 8% have indirect policies, and 8% and no policy.
- 17% of the jurisdictions use the Williamson Act to preserve agricultural land.

Findings from interviews of the Local Policy Survey participants include:

- Regulations in floodplains range from a ban on development to no restrictions. Respondents indicated that development was likely in the latter case.
- Various types of development controls apply to hillside areas. The conditions necessary in order for special controls to apply may be a specific elevation, a percent slope, or a slope stability risk zone. The controls include bans on development, requirements for soils and geologic investigations, lower density zoning, and cluster zoning.
- Regulations on Bay mud and other soils with known bearing material problems range from doing nothing to attempts to limit development through indirect purchase of property.
- Zoning of agricultural land ranges from less than 5 acres to 100 acres per parcel. The agricultural zoning of smaller lots is used as a holding zone prior to eventual development.

Findings from the review of selected seismic safety elements include:

- The policies in most seismic safety elements are impossible to evaluate by themselves. If they are interpreted stringently, proposed development could be highly restricted. If not, they need not affect development.
- As of January 1977, only 71 of the 101 jurisdictions had adopted a seismic safety element or its equivalent.

These findings were used in developing the survey questionnaire. They provide a basic understanding of the general types of regulations that are being used.

The questionnaire was mailed to all 101 local governments in the Bay Area in early April 1977. Staff members were asked to return the form by the end of April. By May 13, 1977, 51 of the 101 jurisdictions had responded, including 45 of the 92 cities and six of the nine counties. Table 1 lists these by county.

TABLE 1: LIST OF CITIES AND COUNTIES RESPONDING TO QUESTIONNAIRE

Alameda County

County
Albany
Berkeley
Emeryville
Fremont
Hayward
Newark
Oakland
Pleasanton
San Leandro
Union City

Contra Costa County

County
Concord
Lafayette
Martinez
Moraga
Pinole
Richmond
San Pablo

Marin County

Corte Madera
Fairfax
Mill Valley
Novato
Sausalito

Napa County

County
Calistoga

San Francisco County

San Francisco

San Mateo County

Colma
Daly City
Foster City
Half Moon Bay
Menlo Park
Millbrae
Pacifica
Portola Valley
San Carlos
San Mateo
Woodside

Santa Clara County

Gilroy
Milpitas
Mountain View
Palo Alto
Santa Clara
Sarotoga

Somona County

County
Anon. City *
Healdsburg
Santa Rosa

Solano County

County
Fairfield
Vacaville

SURVEY FINDINGS

FAULTS

1. 23 of the 51 jurisdictions require geotechnical studies for both minor and major subdivisions within Special Studies Zones designated by the State Geologist. (26 of the 51 do not have these zones in their area.)
2. Eleven of the 25 jurisdictions with these zones require studies even for a single residence. For most of these, however, the proposed residence had to be in the central part of the zone.
3. 20 of the 51 jurisdictions require fault studies to be performed prior to the construction of certain types of structures, regardless of location.

* No name given in questionnaire

These types of structures include:

- high rise buildings
- major or critical structures
- very critical buildings
- high priority buildings
- some commercial and high use buildings
- those required by the Uniform Building Code (UBC)
- "all those in a special studies area designated by the jurisdiction"
- planned unit developments
- hospitals
- all structures in areas of greater than 10% slope
- the city administration building

GROUND SHAKING

1. All jurisdictions except San Francisco have adopted the Uniform Building Code. Two jurisdictions use the 1970 UBC, 34 use the 1973 UBC, eleven use the 1976 UBC, and three did not specify the year.
2. Only seven jurisdictions have adopted additional codes related to seismic design. San Francisco has adopted its own code, which is stricter than the UBC. From the descriptions of these, most appear to be requirements for geotechnical studies rather than structural design requirements. The major exception to this is Santa Rosa, which amended the 1973 UBC to designate Santa Rosa as being in Seismic Zone 4 and to further restrict the scope of buildings which do not have to be designed by an engineer or architect.
3. Only 13 jurisdictions have specific mechanisms for mitigating hazards that may result from existing structural conditions. These requirements include:
 - the UBC Dangerous Building Code or a similar inspection and abatement program in a redevelopment area
 - inspection of buildings at time of sale
 - a special survey at the time of the first Community Development Block Grant application to determine areas to be considered for rehabilitation
 - a requirement for approval of a change in use for any pre-1933 masonry buildings subject to investigation and abatement of hazards
 - a resolution that all buildings built before 1958 must be inspected and those found structurally inadequate be rehabilitated
4. 38 of the jurisdictions have or use an earthquake emergency plan that has been approved by the California Office of Emergency Services. All six counties responding had such a plan. An additional three plans are about to be adopted. One jurisdiction has a plan that has not been approved by OES.

5. 43 of the jurisdictions regularly participate in periodic local and areawide disaster exercises. One jurisdiction is arranging such an exercise. Only one of the six counties has not participated in such an exercise.

6. 25 jurisdictions indicated that provisions are made for planning the general emergency response made necessary by new projects at the time of project review. Those who expanded on this answer indicated that the fire departments or both the fire and police departments are asked to comment on proposed projects.

7. The question of whether or not a jurisdiction has developed a process for rebuilding in a manner that minimizes public hazards from future earthquakes elicited a great variety of responses. (Perhaps this indicates that the question was ambiguous and that few, if any, jurisdictions had thought about such a process.) 29 jurisdictions indicated that they do not have such a process. 13 jurisdictions indicated that they do not have such a process except for the provisions of the UBC or that they do have such process and it is the UBC. Four jurisdictions referred to a local parapet ordinance or hazardous buildings ordinance. Two jurisdictions referred to unspecified provisions in their Seismic Safety Elements. Only three jurisdictions described actual processes. Contra Costa County's Seismic Safety Element directs the Planning Department to conduct a review of the General Plan following any earthquake that produces damage in the county, with special emphasis on affected areas. It further states that geologic, seismic, and earthquake engineering information developed in the aftermath of such an earthquake should be prominently considered during this General Plan review. Portola Valley indicated that rebuilding of certain commercial and institutional buildings within a prescribed distance from a known fault is controlled through a conditional use permit procedure. Mountain View has established which areas are most likely to sustain damage and where, if major damage does occur, it will rezone for less intensive uses and require stricter building requirements.

STREAM FLOODING

1. 15 jurisdictions indicated that they prohibit development in floodplains. However, nine of these also either indicated that they impose special structural controls on development in floodplains or specified that development is prohibited only in floodways or channels, leading one to conclude that development usually is not prohibited throughout the floodplain. 30 jurisdictions indicated that they do not prohibit such development. Six indicated that there are no floodplains in their jurisdiction.

2. 38 jurisdictions indicated that they have special structural standards in floodplains. Occasionally, these requirements are in conjunction with flood control requirements. The structural controls used are elevating the structure and flood-proofing it, largely as a result of the National Flood Insurance Administration regulations.

3. 35 jurisdictions are proposing flood control engineering projects to deal with flood problems. Another jurisdiction indicated that it had done so in the

past, but does not anticipate doing so in the future.

4. 35 jurisdictions are part of flood control districts. All those jurisdictions in Santa Clara, Solano, and Sonoma Counties indicated that they belong to, or were about to belong to, such a district.

5. 21 jurisdictions indicated that flood-free areas tend to be developed first.

6. 47 of the jurisdictions indicated that they participate in the National Flood Insurance Program. Of the remaining four, three indicated that there are no flood-prone areas in their jurisdiction.

7. 46 jurisdictions have been officially mapped for the Flood Insurance Program. Three more jurisdictions are being mapped at the present time. One of these three, Solano County, is the jurisdiction that indicated that it does not participate in the Flood Insurance Program even though flood-prone areas occur within its boundaries.

8. 39 jurisdictions indicated that they have a policy to preserve the natural channels of streams.

DAM & DIKE FAILURE INUNDATION AREAS

1. Two jurisdictions indicated that they prohibit development in areas that would be inundated if a dam or dike should fail-- Hayward in Alameda County and Half Moon Bay in San Mateo County.

2. Oakland in Alameda County, Corte Madera and Novato in Marin County, Menlo Park and San Mateo in San Mateo County, and Palo Alto in Santa Clara County indicated that special structural standards are required in these areas. Solano County indicated that such standards are proposed.

HILLSIDE AREAS

1. 40 of the 51 jurisdictions, including all six counties, indicated that they require geotechnical studies on hillsides prior to development. (5 cities stated that there are no hillside areas in their jurisdictions.)

2. 36 jurisdictions indicated that they have hillside areas zoned at a lower density than flat areas. 17 of these jurisdictions indicated that a slope-density formula is used.

3. 29 jurisdictions stated that certain types of development are prohibited on identified active landsides. There apparently was some ambiguity in the meaning of this question, however. Many who answered in the affirmative stressed that all hillside development is subject to approval by a soil engineer or geologist. A couple of cities who answered it negatively followed their answer with the same explanation. Consequently, some jurisdictions who answered "no" may actually prohibit development if the soils report identified unsuitable slopes. Therefore, the total figure may be low.

4. 43 jurisdictions, including all six counties, indicated that they have grading ordinances. 19 of these specified that they use Chapter 70 of the Uniform Building Code.

5. 45 jurisdictions stated that soils investigations are required for developments in hillside areas at least occasionally. (4 cities stated that they do not have hillsides.) An additional city stated that it is preparing such a requirement. Only Calistoga indicated that soils investigations are not required. Many stated that such requirements are not mandatory, but rather depend on the size of the development and its location. Therefore, a special problem might be needed before a report would be required for a single residence.

6. 33 jurisdictions have special control measures that are required during construction. These measures may be imposed by enforcing:

- conditions of subdivision approval
- UBC controls
- the local grading ordinance
- soil report recommendations
- flood control district requirements
- conditional use permits
- mitigation measures proposed in the EIR process
- design review requirements
- FHA standards

Control measures used include:

- energy dissipators
- silt retention or debris basins or ponds
- hydromulching or fertilization
- control of maximum slopes
- use of jute or other stabilizers
- mandatory planting or reseeding for slope stability
- special road designs
- drainage channels
- dust controls
- restriction of vegetation removal

One jurisdiction in Marin County noted that current drought conditions have resulted in the deferral of all landscaping.

BEARING MATERIALS

1. All 28 jurisdictions with areas of Bay mud have or would require special soils and foundation engineering studies in these areas. (One additional city indicated that the area of Bay mud was used as a retention basin.)

2. Nine jurisdictions have restricted the types of development that can occur on areas on Bay mud. Five of these restrict use through zoning; four restrict building types usually pending results of the soils investigations.



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3. Cities or counties may require soils/foundation studies for special areas, such as hillsides or other areas of known problems, for large subdivisions or whenever any new building is proposed.

4. 26 jurisdictions require special ground water studies in areas of high ground water prior to development (other than for approval of septic tank systems). Many indicated that such studies are a part of all soils investigations, although some indicated that special studies are required in areas that might be subject to liquefaction or that might have drainage problems.

RESOURCES

1. 15 jurisdictions, including five counties, have specific policies for resource areas, such as sand and gravel deposits or prime agricultural land.

2. Eleven jurisdictions, including five counties, stated that special zoning applies to these areas.

OTHER

1. The question about whether or not a jurisdiction had provisions to ensure disclosure of areas of known geologic hazards and hazardous buildings elicited a confused response. Those jurisdictions that felt they have such a program cited the EIR process, the fact that maps have been prepared and are on public record, and the Alquist-Priolo Special Zones Act disclosure requirement. At the same time, jurisdictions with the same requirements answered that they do not have such provisions. The only jurisdiction that described an aggressive disclosure program was Santa Rosa.

2. Only six jurisdictions indicated that they have other policies, study requirements, or zoning relating to earth science concerns that have not been covered.

3. The specific geologic concern listed as the largest issue varied. However 18½ stated that hillsides or slope stability problems are the largest issue, while 17½* stated that earthquake-related issues are of primary concern. 34 of the jurisdictions believe they have adequate technical expertise to handle these issues. Of special note is that seven of eight jurisdictions in Contra Costa, San Francisco, ten of eleven in San Mateo County, and all three in Solano County believe they have adequate expertise. At the same time, four of five in Marin County and both in Napa County believe that they need further expertise.

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* If a jurisdiction listed two problems rather than one, its "vote" was divided between the two problems.